# Polarization resolved THz photovoltage response in BSCCO-2212 thin flakes

**Sergio J. Salvia-Fernandez**[1]
Zoe Velluire-Pellat[1], Sergi Battle Porro[1], Qian Li[2], Cheryl Feuillet-Palma[2], Aharon Kapitulnik[3], Frank Koppens[1]

1. *ICFO, Av. Carl Friedrich Gauss 3, Barcelona, Spain*
2. *LPEM ESCPI Paris, 10 rue Vauquelin 75005, Paris, France*
3. *Stanford University, 450 Jane Stanford Way, Stanford, USA*

Sergio.Salvia@icfo.eu

## Abstract

Polarization-resolved photogalvanic effects provide a direct tensorial probe of broken symmetries in quantum materials [1]. In the high-Tc cuprate BSCCO-2212, mid-IR studies have reported the onset of linear and circular photogalvanic responses below T*, indicating inversion symmetry breaking at the transition into the pseudogap state [2]. This mid-IR response, however, vanished below the transition temperature to the superconducting state. In this study, we measure the polarization-dependent photoresponse of Bi2212 thin flakes in the THz regime and find a photovoltage response that does not disappear below Tc. This photovoltage response shows a strong polarization dependence in the superconducting state, whose characteristic axis differs from that found above Tc. These findings suggest that polarization-resolved THz photoresponses can offer new insights into symmetry breaking phenomena in the superconducting state of high Tc superconductors.

## Figures

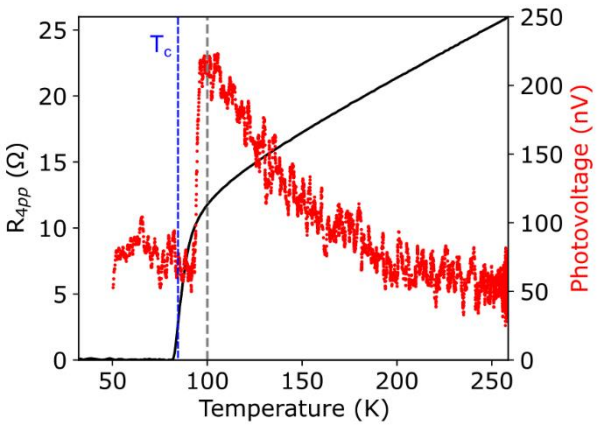


**Figure 1:** Evolution of four probe resistance (R4pp, black solid line) and THz photovoltage (red points) as a function of temperature. Blue dashed line indicates the critical temperature extracted from $R_{4pp}$. Gray dashed line indicates the maximum of the photovoltage.

## References

[1] R. Krishna Kumar et al, Nat. Materials, **24** (2025), 1034-1041
[2] S. Lim et al, Phys. Rev. B, **105** (2022) 155103